barrel **554**. In the illustrated example, the module **500**C does not include an FFL correction layer **532**.

The optical filters discussed above can be implemented in various ways. For example, in some implementations, a dielectric band-pass filter can be applied to the photo sensitive surface of the light sensing element (e.g., an image sensor) or to a surface of the transparent cover that is disposed over the light sensing element. In some cases, such a band-pass filter is deposited onto the transparent cover (or onto a transparent wafer in the case of a wafer-level process) by vapor deposition or sputtering. Preferably the dielectric filter is deposited onto a transparent cover composed, for example, of glass, sapphire or another transparent material that has mechanical/thermal-expansion properties similar those of glass or sapphire. The band-pass filter can be advantageous because it permits a very narrow range of wavelengths to impinge on the light sensing element (e.g., a photodiode or image sensor). A dielectric band-pass filter can, in some cases, permit highly selective filtering. For example, a dielectric band-pass filter can be used to filter out ambient IR radiation while permitting the transmission of a specific desired wavelength of IR (e.g., light being generated from a projected light source).

In the foregoing fabrication examples, a spacer/optics structure (e.g., **72** in FIG. **3**C) is attached directly by adhesive to a PCB or other substrate wafer on which are mounted multiple optoelectronic devices (e.g., light emitting elements or light detecting elements) (see, e.g., FIG. **3**D). In particular, the free ends of the spacer elements of the spacer/optics structure is attached directly by adhesive to the PCB or other substrate wafer. In the resulting modules, the spacer **28** that separates the PCB or other substrate **24** from the transparent cover **26** is composed of a non-transparent material, such as a vacuum injected polymer material (e.g., epoxy, acrylate, polyurethane, or silicone) containing a non-transparent filler (e.g., carbon black, pigment, or dye). See, e.g., FIGS. **2**A-**2**H. In some implementations, however, instead of attaching the spacer/optics structure directly to the PCB or other substrate wafer, the spacer/optics structure is attached to a structural element forming part of the substrate wafer. An example is illustrated in FIGS. **24**A and **24**B, which are discussed below.

As shown in FIG. **24**A, a spacer/optics structure **602** includes transparent covers **604** whose sidewalls **606** are covered by the same vacuum-injected non-transparent material that forms the spacer **608**. A substrate wafer **618** comprises a metal frame **610** having openings and a molded cavity **614**. The molded cavity **614** fits within the openings of the metal frame **610** so that sidewalls of the metal frame **610** are encapsulated laterally by the molded cavity **614**. The substrate wafer **618** (i.e., the combination of the metal frame **610** and molded cavity **614**) also may be referred to as a "lead frame." The metal frame **610**, which may be composed for example of a metal such as copper, aluminum or nickel, has optoelectronic devices **612** mounted on its surface and spaced laterally form one another. Further, the molded cavity **614** should have dimensions that match those of the spacer **608** such that the free ends of the spacer elements **608** and molded cavity **614** can be attached directly to one another by adhesive, as shown in FIG. **24**B. This can be particularly advantageous, for example, where the optoelectronic devices **612** are high-power light emitters (e.g., a high power LED or VCSEL) because the material of the molded cavity **614** can be made relatively inexpensively and also can be highly reflective and resistant to high temperatures. The stack formed by the spacer/optics structure **602** and the substrate wafer **618** can be separated along dicing lines **616** to form multiple modules, such as the module in FIG. **25**A. In some implementations, the substrate wafer structure **618** can be attached to any of the other types of spacer/optics structures discussed above to form other types of modules in which the non-transparent spacer material covers the sidewalls of the transparent cover. Some examples are illustrated in FIGS. **25**B-**25**F. Thus, in some cases the transparent cover **604** may include an optical element on one or both of its surfaces. The optical element can be a lens (see FIGS. **25**A, **25**B and **25**C), an optical filter (see FIGS. **25**D and **25**E) or a FFL correction layer. In some cases, an optics assembly **550** including a stack of lenses can be attached over the transparent cover **604** (see FIGS. **25**F and **25**G).

In the modules of FIGS. **25**A-**25**G, one end of the spacer **608** is attached (e.g., by adhesive) to an end of the molded cavity **614**. Thus, the molded cavity **614** is attached to the spacer **608**, which may be composed, for example, of a vacuum injected polymer material such as epoxy, acrylate, polyurethane, or silicone containing a non-transparent filler such as carbon black, a pigment, or a dye. The sidewalls **606** of the transparent cover **604** in each module can be encapsulated laterally by the same or similar material as the spacer **608**; likewise, the sidewalls of the metal substrate **610** in each module can be encapsulated laterally by the molded cavity **614**.

As used in this disclosure, the terms "transparent," "non-transparent" and "transmissive" are made with reference to the particular wavelength(s) emitted by or detectable by the devices (e.g., **22**A, **22**B, **76**A, **76**B) in the module. Thus, a particular feature, for example, may be considered "non-transparent" even though it may allow light of other wavelengths to pass through.

Various modifications can be made within the spirit of the invention. Accordingly, other implementations are within the scope of the claims.

What is claimed is:

1. A method of fabricating optoelectronic modules each of which includes at least one optoelectronic device and at least one optical element, the method comprising:

providing, on a same support surface, a plurality of singulated transparent substrates separated laterally from one another, each of the singulated transparent substrates having lateral sidewalls that face lateral sidewalls of other ones of the singulated transparent substrates;

using a vacuum injection technique to cover the lateral sidewalls of each of the singulated transparent substrates with a non-transparent material in contact with the lateral sidewalls by providing the non-transparent material in spaces laterally separating the singulated transparent substrates from one another; and

forming spacer elements that project away from the support surface.

2. The method of claim **1** including forming or applying an optical element on the surface of each singulated transparent substrate by an embossing-type replication technique after placing the singulated transparent substrates on the support surface.

3. The method of claim **2** wherein a single combined replication and vacuum injection tool is used for the embossing-type replication technique and for the vacuum injection technique.

4. The method of claim **1** further including forming or applying an optical element on a transparent wafer and subsequently separating the transparent wafer into the plurality of singulated transparent substrates.